DOCUMENT RESUME

ED 412 919 IR 018 582

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TITLE Computer Literacy in the Public Schools.
PUB DATE 1997-10-27
NOTE 13p.
PUB TYPE Reports - Descriptive (141)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; *Computer Literacy; Computer Software; Computer Software Selection; *Computer Uses in Education; Educational Technology; Elementary Secondary Education; Higher Education; *Information Sources; *Public Schools; Research Tools; Standards; Students; Teacher Education

ABSTRACT

In school districts throughout the country, computer literacy is considered a top educational goal, however, too few administrators, teachers, and parents understand what the term really means. The computer plays two roles in schools: information resource--as a complement to books, magazines, video, and other media; and self-contained teaching machine--such as integrated learning systems in which the computer acts like a personal tutor, providing lessons, quick feedback, infinite patience, and detailed achievement records for students to go through at their own pace. It is important to provide workshops to educate teachers and administrators in computer skills. Different types of computer software programs can be used: tutorial software, simulation software, and problem solving software. Different thoughts about how computer use in schools should be stressed include: emphasize precise, measurable objectives prior to instruction; stress problem solving; use an idea centered technology curriculum; use a technology centered curriculum to emphasize pupil/teacher planning of objectives, learning opportunities, and evaluation procedures. The paper also covers psychology in computer use and national standards in education. (Author/SWC)

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COMPUTER LITERACY IN THE PUBLIC SCHOOLS

Marlow Ediger

The use of computers is rapidly increasing in the societal arena. Banks, supermarkets, hardware stores, car dealerships, and the business world in general, are using computers to store and retrieve data. The school setting is attempting to catch up with the use of computers. Schools are a nonprofit organization and depend upon tax moneys to pay for computers. As there is an increased amount of money in the school budget for technology purchases, more pupils are experiencing computer services than ever before.

In school districts throughout the country, computer literacy is considered a top educational goal. But too few administrators, teachers, and parents understand what the term really means. What passes for computer literacy in many schools is a shadow of of the real thing. To understand why, we need to look at the two roles the computer plays in most schools: information resource and self -contained teaching machine.

As an information resource, the computer can complement books, magazines videos, and other media. For example, a fourth grade teacher might augment a unit on animals with an article from a multimedia encyclopedia or other software- based resources. The advent of the CD ROM, with its large storage capacity, has made such information-based software readily available.

But most educational software is designed to turn computers into teaching machines. A class of programs called integrated learning systems enables a computer to act like a personal tutor in subjects as diverse as reading, writing, mathematics, and foreign languages. Students go through such programs at their own pace, with the software providing lessons, quick feedback, infinite patience, and detailed achievement records (German, 1997) .

School administrators need to understand and value technological use in the classroom. School administrators should perceive the necessity of implementing technological use in the classroom so that

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pupils may achieve more optimally. No doubt, there are school administrators who lack quality experiences with technology and therefore do not see the need for pupils experiencing learning activities involving technology. Each principal and supervisor should avail themselves in learning more about technology and how to integrate its use into the school curriculum. Talking to and learning from classroom teachers, as well as teachers learning from principals, should assist the school in realizing the importance of technology in a modern curriculum. Staff development programs in using technology in the curriculum should be in the offing. Teachers and administrators need to realize the importance of an updated curriculum. The school of today and the work place of tomorrow should not be in isolation from each other, but rather integrated entities. Definite goals in inservice education using technology are musts! These goals and experiences for participants need to be carefully chosen. Relevance and and importance are two concepts that need careful consideration when inservice education programs are developed and implemented. The goals of the workshop should be clearly stated and cooperatively developed by workshop participants... (Ediger, 1997).

Computer software has different purposes in its use. Drill and practice programs began as basic instruction on such topics as multiplication tables, for example. Over the years their power, sophistication, and subject coverage have grown...

Tutorial software offers the best hope... for computer based individualized learning. The software, often with multimedia attributes like full motion video and sound, is written to tutor slow to fast students. Usually these programs offer teachers with some breakdown on student progress...

Simulation software artificially creates a real life experience and this artificial real life can be extremely interesting and effective. The approach is anything but rote, but (especially for scientific and technical subjects) draws on and augments the knowledge of participants. It can be used for single or large group players. The number of commercially available simulation programs is burgeoning. As the image resolution

and full page display capabilities of computer monitors improve, the realness , if you will, of simulations will further improve...

Problem solving software tests critical thinking and judgment, often without looking for a "right answer." One product, for example, centers upon the accidental breaking of a teacher's vase by two students who had wanted to hide her two pencils. The player is first prompted to select (on the computer) four goals in order of importance. The goals are: 1. always be honest and tell the truth; 2. maintain good relations with peers; 3. protect yourself; 4. be well liked by your peers. Then repeated throughout the play, the player is prompted to select an option. For example, 1. tell the teacher you didn't break the vase; 2. say that you didn't see who broke it; 3. say the other boy broke it; and 4. say nothing. Then at the end of the program, a player is graded by the computer on how well his or her answers accorded with the goal selection. The program also allows a group of students to play with each student representing a separate "goal." The user manual states that the goal of the product is to represent the player with the consequences of his or her actions (Cosmann, 1996).

Schools of Thought in Computer Use

There are different schools of thought in terms of how computer use is to be stressed. The first school of thought emphasizes that precise, measurably stated objectives be written prior to instruction. These objectives might be state mandated or locally written. Care must be taken to write objectives that are relevant and important for pupils to achieve. Much time needs to be given in writing precise objectives that have worth, not trivia nor the unimportant.

Once the objectives have been agreed upon, they provide guidance to the teacher in stressing content to be taught. Computer programs should then emphasize, as learning activities, that which is contained in these precise objectives. Thus, drill and practice, tutorial, simulation, and games may provide necessary subject matter in order that each pupil might achieve the predetermined measurably stated objectives. In multimedia technology procedures, CD ROMs, and internet

may offer further learning opportunities to pupils in achieving these precise objectives.

After instruction, the teacher needs to measure if pupils have/have not achieved the stated objectives. If objectives have been achieved, the pupil may move on to increasingly more complex objectives within the learning sequence. Those pupils not mastering what is in the stated objective(s) need other teaching strategies involving technology in its diverse forms.

A second school of thought in assisting teaches to guide pupil achievement is to stress problem solving. Within a unit of study, pupils identify a problem. The problem needs to be clearly stated so that pupils understand what will be achieved. After problem selection, pupils may gather data or information to solve the open-ended problem. Diverse reference sources using technology might then be used as information sources. A hypothesis is obtained from the information acquired to solve the problem. The hypothesis is tested with the use of additional technology sources of information.

A third school of thought in teaching pupils is an idea centered technology curriculum. Thus, in an ongoing unit of study the teacher has general objectives for pupils to achieve. These objectives are more openended as compared to the teacher who desires measurably stated objectives in teaching and learning situations. Pupils with teacher guidance use a variety of technology to secure information pertaining to the sequential openended objectives as stated in the curriculum. Whatever the topic being studied, the teacher guides pupils through technology use to secure information in depth. The teacher observes how well pupils are realizing the general objectives. Subject matter achieved by pupils may or may not emphasize problem solving. Basic, essential subject matter may be obtained by pupils that is relevant and guides in attaining the general objectives.

A fourth school of thought in using a technology centered curriculum is to emphasize pupil/teacher planning of objectives, learning opportunities, and evaluation procedures. The planning is done after pupils have been orientated to the new unit of study. Thus pupils

plan with the teacher what they wish to learn. The means of learning are also planned cooperatively in that information sources need locating. Cooperative evaluation is a further ingredient of teacher/pupil planning school of thought in the curriculum.

An additional procedure here is for the teacher to develop learning stations, perhaps seven to eight stations per classroom. Tasks on a card are listed at each center. The pupil then may determine what he/she wishes to learn as well as what to omit. There are an ample number of tasks so that the individual pupil may select what to learn and what to omit. A variety of technology is available to guide pupils in the learning process (Ediger, 1995).

Psychology in Computer Use

Psychologists in education tend to agree that learning activities involving technology use should be

1. meaningful in that pupils understand what is being presented via technology. With meaning, pupils understand that which has been presented inductively or deductively.

2. interesting in that content and skills capture pupil attention. The use of technology provides time whereby pupils are thoroughly involved in the ongoing experiences.

3. purposeful whereby pupils perceive reasons for learning. Pupil purpose is a tremendously salient factor in guiding pupil learning. Intrinsically, pupils should develop a need for learning in ongoing units and lessons.

4. integrative among three kinds of objectives. Thus, relevant knowledge needs to be obtained by pupils. Skills that guide in using the obtained knowledge also need to be developed. Quality altitudes are beneficial in that an increased amount of knowledge and skills may be developed.

5. sequential in that pupils perceive new learnings secured as being related to those previously obtained. The relationship of the new and the previously secured subject matter should guide pupils to perceive the relationship of ideas (Ediger, 1994).

Based on learning opportunities being meaningful, interesting, purposeful, integrated, and sequential, there are selected specific psychologies that merit attention in technology use.

There are teachers who desire that objectives be precisely stated. These specific objectives then provide direction in selecting learning opportunities. The chosen objectives emphasized by the teacher assists pupils to achieve the precise ends. After instruction, it can be measured if pupils have been successful in goal attainment.

A second psychology of learning stresses that openended, general objectives be used in teaching. These objectives are clearly stated, but do not possess the measurable component. More leeway is then given the teacher in planning sequential learning opportunities for pupils. Thus, pupils with teacher guidance are orientated to the new unit of study using technology, but the sequence now resides largely within pupils in planning cooperatively what to learn. Learners may then wish to work in committees to complete planned experiences. The teacher is a guide and assists pupils to stay on task with the use of technology. Evaluation consists of pupils with teacher guidance appraising that which has been learned, using quality criteria.

A third psychology of learning stresses a project method. Here, within an ongoing unit of study, pupils perceive a need or purpose. The need/purpose involves a problem area. The purpose is clarified so that meaningful learning accrues. After establishing purpose, pupils plan what needs to be done to obtain knowledge/skills to solve the problem. Technology needs to be surveyed and chosen for problem solving. Following planning, the involved pupils carry out the plans. Quality procedures need to be used here. Responsibility rests with pupils and teacher assistance. Criteria need to be developed to appraise the completed project in order to evaluate its worth or value.

A fourth psychology of learning emphasizes that pupils choose from among alternatives that which is to be selected as activities and experiences. The teacher might then develop learning centers pertaining to the unit of study being taught. The individual pupil chooses which center and which station to work at. The chosen tasks may be

individual or committee work. The pupil does the sequencing in a psychological curriculum. He/she determines what comes first, second, and third in terms of activities and experiences. Sequence resides within the pupil, not the teacher nor within teaching materials. If the activities do not meet personal needs of a pupil, he/she may plan with the teacher an alternative route of learning (Ediger, 1996).

A fifth psychology of instruction emphasizes that pupils possess many intelligences and ways of presenting information acquired. A pupil then may well have a preferred approach to learning and revealing learnings such as verbal/ linguistic, logical/mathematical, visual/spatial, musical, bodily/kinesthetic, interpersonal, scientific, humanistic, and intrapersonal procedures (Gardner, 1993).

Pupils should then have a greater say in how to indicate what has been learned. For example, a pupil may prefer to work with others or work individually in ongoing activities and also prefer to show what has been achieved in one of the two approaches— interpersonal or intrapersonal. Or, a pupil in a history class may wish to show learnings acquired through musical experiences. Much history has been recorded in musical form with both lyrics and musical scores. There are numerous ways for pupils to show what has been learned to others. There are multiple intelligences to indicate these learnings. Through technology, one may indicate to others the breadth and depth of experiences and achievements.

National Standards in Education

Presently, much emphasis is being placed on national and state trends to motivate pupils to achieve more and at a more complex level. This includes the area of technology and computers. My concerns when developing national and state standards are the following:

1. That the standards are realistic and achievable by learners. If the standards are too difficult, there may be many pupils failing in school. Pupils should achieve optimally to be sure. But, the standard setters need to avoid becoming overly ambitious in establishing goals not attainable.

2. that pupils and the teacher locally also have input into the curriculum. Having standards set by those outside the local school district, removes the teacher's chances of becoming very knowledgeable about each pupil's talents and abilities. It is more difficult to provide for individual differences when the standard setters are far removed from home base.

3. that pupils may not feel motivated to learn when the objectives chosen have little or no relevance for the learner. Standard setters are human beings like the rest of us are. They have their biases and preferences also. To be sure, there will be some common agreement about objectives that pupils need to achieve.

4. that too much forcing will be emphasized in a hierarchy from the standard setters to teachers and pupils in the classroom.

For computer literacy to occur, pupils need to understand hardware components and how systems such as Microsoft Windows and Mac OS works. Learners need to to be able to switch between multiple programs through a menu structure and change fonts. Pupils also need to be able to develop a spreadsheet formula. There are many tools for for software use and committee endeavors in writing. these include CAI programs, CD ROMS, drafting, spelling checkers, analyses of text, calculators, graphics, word processing, and online databases. Pupils should be creative in determining what to do when certainty is not there in computer use. Asking for assistance is one approach, but becoming a problem solver is more important. Life consists of problems to be solved.

Feasible national and state standards are needed in the technology/computer curriculum. Technologies as conduits to new knowledge, resources, and higher order thinking skills have entered classrooms and schools nationwide. Personal computers, CD-ROMS, online services, the World Wide Webb, and other innovative technologies have enriched curricular resources and altered the types of instruction available. The new Office of Technology Assessment (OTA) report, "Teachers and Technologies: Making the Connection" provides evidence that schools access to technology is rising steadily. OTA

reports 5.8 million computers are available in school for instruction – about one computer for every nine students. Approximately 35% if schools can access on-line services, 30 % have CD ROMS, and nearly all have TVs and VCRs. Most of these technologies are used for traditional instruction, such as presenting information, basic skills practice, word processing, and developing computer literacy. Teachers. are, however, beginning to to use more innovative applications—using desktop publishing, developing mathematical and scientific reasoning with computer simulations, gathering information using on line services and CD ROM databases, and communicating via E- mail (Hartley, 1997).

Computer literacy is also for pupils with special needs, Hoge and Rogers (1996) wrote:

Why would a speech language teacher need technology to work with children with special needs? Studies of augmentative and alternative communication suggested options, but did they apply to the realities of my students?

Assigned to work with children with serious communication disorders, I soon saw the difference that technology can make. Technology is a motivating tool. The other therapists and I learned that technology unleashes potential and creates opportunities for social interaction.

We began with simple application of technology– a big round switch and a tape recorder. Suddenly, a child would demonstrate that she knew what would happen when she pressed a switch—music played.

In another classroom, the special day class teacher and I applied for a small grant to get software and switches that special- needs could use to play with regular education peers on the classroom computer. They found they could race each other, play jokes and trade comments. Disabilities were less a factor that they had been without technology. Pressing a key too play a game involves less muscle coordination than many other more physical games...

Children with special needs deserve a way to interact socially with others. Sometimes physical limitations eliminate normal playground

activities. Sometimes communication limitations interfere with normal requests, comments and conversation so integral to a child's world. Technology provides alternatives. Accessing technology can be as simple as depressing a switch with a finger or an arm. Even chins and feet work if necessary. Muscles used in pointing are far simpler than the complex ones required for many other kinds of interactions.

In Closing

School and society should be integrated, not separate entities. In the societal arena, much use is made of technology. The school setting also needs to have pupils become proficient in computer literacy. For example, all pupils should learn to use the word processor. The typewriter of the past is a museum piece. When I started university teaching in the 1962-1963 school year, there were an endless number of typewriters on campus, but no word processors. Even in typing classes, the typewriter only, was used by the instructor and students. Now, a typewriter, for at least twenty years has not be visible on the university campus. I remember one of our school of education secretaries, twenty-five years ago, who was so efficient in using the typewriter feared using the word processor. After trying the word processor for the first time, she realized the key board was so similar to the typewriter keyboard; she also realized the many benefits of the word processor over the typewriter.

I have written and had published over 2,200 manuscripts on educational topics. Formerly, I wrote all manuscripts in longhand using paper and pencil, never having had a typing class. Work study students then would type the manuscripts and return then for proofing. In the days of the typewriter, there were so many corrections to be made! It was very time consuming to proof and return the manuscript, again and again to the work study person for revisions. Liquid paper or white out was a very useful item to possess in the days of the typewriter. Some errors could then be corrected rather quickly by using liquid paper or write out, and retyping those letters or words. I finally wondered why not learn to use the word processor on my own, with no previous course work or

practice in typing. The rest is history! With much effort, I have learned to use the word processor. I make quite a few typing errors, but with spell check, I could now type a final copy of a PH D thesis. The word processor is an amazing device. I type directly into the word processor without first writing in longhand. This approach has truly save time, work, and effort. The final copy looks neat and attractive.

In writing about the future pertaining to technology, Mehlinger (1996) wrote:

Finally, technology will have greater intelligence. This intelligence will be displayed in several ways. First, the technology will have more features and greater capacity. Second, it will have the capability to learn from the user, so that it can customize its services to fit the user's learning and interest. Future technology will provide not only data bases but knowledge bases. And technology will be able to stay abreast of that information most valued to the user and alert him or her to its availability. Integration, interaction, and intelligence. These are the three features we can expect of technology in the future. And they will change the way technology is employed in schools.

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